PRACTICAL ACTION
Intermediate Technology Development Group

QUALITY ASSURANCE CHECKLIST (3)

HOUSE MAINTENANCE IN RESETTLEMENTS FOR HOUSE OWNERS AND OCCUPANTS

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PREFACE

The maintenance of a house affects all its users continually, because they depend on the state of the home not only for comfort, but for economic survival as well. Maintenance begins the day the builder leaves the site. Design, materials, workmanship, function, usage and their interrelationships, as well as the environment will determine the amount and type of maintenance required during the lifetime of the building. Proper maintenance requires considerable effort, and expense. However, both effort and expense can be largely reduced by ensuring that maintenance procedures are carried out systematically and regularly. Procrastination in carrying out necessary inspection and maintenance on a building often results in expensive repair or replacement of building components due to degradation of materials, and sometimes even collapse of parts of the building. Buildings that are located where salty air from the sea, or strong winds and rain directly affect the structure especially require systematic and careful maintenance. Building materials such as concrete, bricks, woodwork, metal and different types of roofing materials are adversely affected by these factors as well as the sun. Routine and periodic maintenance will inhibit deterioration of building components and extend the life expectancy of the building.

This document is intended to provide basic guidelines to occupants of houses that have been constructed in new resettlements in Sri Lanka. However, the information can also be used in maintaining any domestic building in other tropical regions as well. Effective building maintenance requires **the correct diagnosis of defects** and **implementation of correct remedial measures** in a cost-effective manner. It is hoped that users of this document will be assisted in carrying out meaningful maintenance procedures using available resources that will extend the life expectancy of the house to the optimum extent. The information included in this document covers the following basic aspects of maintenance:

- The nature and importance of maintenance
- Basic maintenance materials and equipment
- Building maintenance problems and solutions

The following information has been gathered from numerous sources and we are indebted to the writers and publishers of these publications as well as websites from which invaluable data has been obtained. All sources of information are listed at the end of this document.

NATURE AND IMPORTANCE OF BUILDING MAINTENANCE

It is not realistic to expect buildings to be maintenance-free, though design and construction standards can enhance effective maintenance. All elements in buildings deteriorate at a greater or lesser rate depending on materials, methods of construction, environment and the use of buildings.

Maintenance has been defined as: “The combination of all technical and associated administrative actions intended to retain an item in, or restore it to, a state in which it can perform its required function.” This means that maintenance of a building should ensure that it is cared for in an efficient state, in efficient working order and in good repair so as to sustain the utility and value of the building. Building maintenance has been variously categorized as – planned, un-planned, preventive, corrective, emergency, and scheduled etc. This document will focus on **preventive maintenance**: “The maintenance carried out to reduce the probability of failure of the performance degradation of an item.” Some of the information in this document can also be applied in carrying out **corrective maintenance**: “The maintenance carried out after a failure has occurred and intended to restore an item to a state in which it can perform its required function.” Maintenance work has also been categorized as ‘predictable’ and ‘avoidable’. Predictable maintenance is regular periodic maintenance work that may be necessary to retain the performance characteristics of a product, as well as that required to replace or repair the product after it has achieved a useful life span. Avoidable maintenance is the work required to rectify failures caused by poor design, incorrect installation or the use of faulty materials.

It must be understood that maintenance is labour-intensive and is inevitable. Therefore it is very important to recognize that regular maintenance is vital for the upkeep of a building, despite the considerable effort and expense it entails. Timely maintenance will save on added costs that result from delays in rectifying problems that develop in buildings.

Maintenance needs

A prime aim of maintenance is to preserve a building in its initial state, as far as is practicable, so that it effectively serves its purpose. Some of the main purposes of maintaining buildings are:

- retaining value of investment.
- maintaining the building in a condition in which it continues to fulfill its function.
- presenting a good appearance.

Nature of maintenance

Maintenance is comprised of three components: **servicing**, **rectifying** and **replacing.**

Servicing is essentially a cleaning operation undertaken at regular intervals of varying frequency. The frequency of cleaning varies – typical frequencies being: floors swept daily and polished weekly or bi-weekly; windows washed monthly, painting and decoration every four years.

Rectification work unusually occurs quite early in the life of a building and arises from shortcomings in design, inherent faults or unsuitability of components, or damage in installation and incorrect assembly. This requires the correct installation of suitable materials or components.

Replacement is inevitable because improper installation and / or environmental conditions cause building components and materials to malfunction and decay with the passage of time. Much replacement work stems more from deterioration of appearance than from physical breakdown of materials. The frequency of replacement could often be reduced by the use of better quality materials and components.

Factors that bear on the need for building maintenance

The elements: rain, wind, and sun are the primary factors that adversely affect buildings. In Sri Lanka it is important to be aware of the relevance of annual monsoons and inter-monsoon rains in building maintenance (**Fig. 1**). The primary monsoons are the south west monsoon (between April and August) and the north east monsoon (between October and

Fig 1 - **SriLanka wind loading zones**

February). The inter-monsoon periods occurring twice a year bring convectional rain with afternoon thunder showers with winds from the sea bringing rain clouds inland. It must be noted that wind and rain during each monsoon period will be from a south westerly or north easterly direction. Another significant factor that contributes to degradation of building materials is salt laden air which is present along coastal areas. The salt content in the air has an extremely corrosive effect on all types of building materials, particularly metals. Other minor factors are:

- Human use (wear and tear), as well as misuse
- Deterioration caused by insects and rodents
- Vegetation (leaves, branches and roots of trees)

It is important that openings (doors, windows, grilles etc.) on external walls must be adequately shielded from the wind and rain. If the building has not been provided with weather shading devices such as sun shades or awnings, it would be necessary to add suitable shading devices or awnings at openings in external walls that are exposed to the south west and north east (**Fig. 2**). This will ensure that window

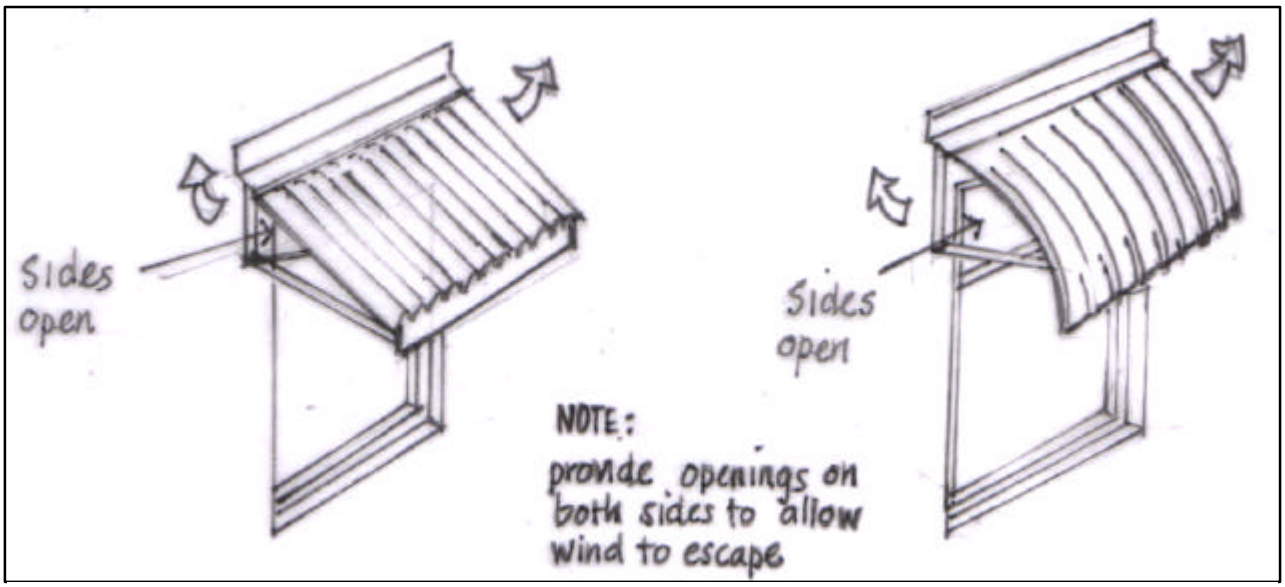

Fig 2 - **Awnings**

and door frames do not deteriorate quickly and will prevent entry of water or dampness into the building.

Wear and tear from human use or misuse of a building requires maintaining the exterior of the house as well as the interior. It is also important to maintain the area around the house including the garden, walkways, fences, gates etc.

BASIC BUILDING MAINTENANCE MATERIALS AND EQUIPMENT

It is very necessary to be adequately equipped to carry out needed maintenance. Therefore it is vital that each household should have needed supplies and tools on hand at all times (**Fig. 3**). Listed below are some items that would be required in a typical home maintenance equipment kit:

Essential maintenance materials and equipment

- A block of sponge - to clean sinks, wash-basins etc.
- One squeegee – to clean floors
- A packet of cleaning powder
- A small quantity of borax powder
- A mild liquid detergent (soapy water or dishwashing liquid are viable options)
- One packet of laundry detergent powder
- One mop with a long handle and pail
- One screw driver with insulated handle
- A packet of assorted size rawl plugs – to hold screws firmly in place
- A selection of screws of different sizes – to use instead of nails
- A selection of different sizes of nails for driving into concrete
- One hand augur (Alice katuwa) - to make holes in walls to take rawl plugs with screws
- One hammer (preferably a claw hammer) to drive in and remove nails
- One six foot high aluminium ladder (preferably folding type for stability)
- One dusting cloth for dusting (a dusting brush can be used as an alternative)
- A small supply of cotton waste for cleaning
- One broom (coir or equivalent) – to sweep interior floors
- One garden broom
- One small axe or heavy duty knife (ketta) to cut small branches of trees
- One pair of rubber gloves

Fig 3 - **Basic maintenance equipment**

- A cloth face mask- to prevent ingesting of paint fumes or dust

Useful maintenance materials and equipment

- A suitable commode cleaning substance (that does not kill bacteria in septic tanks)
- A few ounces of washing soda
- A small quantity of baking soda
- A small quantity of chlorine bleach
- A small quantity of vinegar
- One commode cleaning brush with holder
- A packet of epoxy putty (or equivalent) to plug holes or cracks and prevent leakages n plumbing and sanitary fittings
- A few nylon and fibre washers for taps
- One adjustable spanner – to loosen and tighten nuts on taps etc.
- One small hack saw – to cut pipes
- One small hand saw – to cut wood, plywood etc.
- One litre bottle of kerosene oil
- One small can of multi-purpose oil – for oiling hinges etc.
- One electrician's pair of pliers – 15 cm long.
- One tester screw driver used for electrical work
- One roll of insulating tape
- One adjustable wrench – to open tap nuts/ bottle trap, etc.
- One spout cleaning rod or wire – to clean choked balcony spouts
- One broom with long handle – to clean ceilings and underside of eaves
- One brush with long handle and sturdy bristles for scrubbing floors and walkways
- One hand brush with short handle and sturdy bristles for general brushing
- One dust pan with handle
- One small size squeegee (newspaper is a viable option) – to clean glass panes or to wipe ceramic wall tiles.
- One sink cleaning plunger
- A selection of mixed grades of sand paper (Nos. 100, 120, 180)
- One small metal scraper for removing paint
- One small tin of anti-rust paint
- One paint brush for painting wood and metal work
- One paint brush for painting walls (roller brush is better if it is affordable)
- One tube or small tin of suitable adhesive for pasting wood, veneers, metal and glass etc.
- One pair of garden shears to trim hedges and plants
- One long handled scythe with single blade (*visiketta*) to cut grass
- One mammoty or spade
- One crow bar

All equipment should be readily accessible to the occupants of the house/building and should be kept in an orderly manner in specified locations within the premises.

BUILDING MAINTENANCE PROBLEMS AND SOLUTIONS

A systematic maintenance approach allows one to monitor the condition of various building components. This section sets out items in buildings to be inspected regularly as well as a suggested maintenance schedule.

House inspection at time of takeover

It is important that occupants of new houses must carry out a preliminary inspection of the house when taking it over. Some items that any layman can inspect are listed below: Check the following:

- Are the floors and floor renderings free of cracks?
- Are walls vertical and free of cracks?

- Are reinforced concrete slabs (floors/roof) free of cracks?
- Is the surface of the plaster work of an acceptable standard (evenly surfaced)?
- Is there any damage to finishes (paint, varnish, etc.) on walls, timber, and metal?
- Are toilet and bathroom floors properly sloped to drain surface water effectively?
- Has the grouting of floor tiles and wall tiles been done properly?
- Do all toilet fixtures work properly? (E.g. flushing of WCs and draining etc.)
- Is the plumbing working properly (free of leaks, air blocks etc.) with adequate water pressure?
- Are cleaning eyes appropriately provided in the sanitary waste pipe systems? Where cleaning eyes are not used at berds, are 'T 'junctions used with a removable end cap?
- Do all windows and doors open and shut properly without getting stuck?
- Do all the hinges on doors and windows have the required number of screws?
- Do all doors have handles and locks that work well?
- Are the doors and windows on external walls watertight?
- Is the roof properly sloped according to the roof type (tiles, corrugated sheets, flat roof)?
- Is the roof free of sags or depressions on its surface and edges?
- Are the roofing sheets or tiles properly lapped in both directions?
- Is the roof watertight (note evidence of leaks and dampness within the house)?
- Are areas around projections that penetrate through the roof (such as chimneys, and pipe stacks etc.) watertight?
- Are rainwater gutters and downpipes adequately sized and securely fitted?
- Do all power outlets, lamps and other electrical fixtures have power?
- Is the on-site sanitary waste handling system (septic tank) properly constructed above water table level without evidence of leaks in the first and second chambers?
- Does the surface water on-site drain efficiently, without leaving patches of stagnant surface water and mud?
- Does the well on-site have a protective wall surrounding it for safety?

If any of the above weaknesses are noted it would be necessary to enlist the services of capable personnel to rectify all of the items without delay. The roof, walls, floors and septic tank should be given particular attention. Some defects may be rectified by the occupants of the house without recourse to employing tradesmen. However, whether tradesmen are used or the occupants carry out the rectifications themselves, the following information can be helpful in knowing what corrective measures can be taken to rectify defects in houses.

Items to be checked regularly

Chimneys: Chimneys should be inspected for loose or deteriorated bricks or mortar. Chimney flashings especially should be checked regularly for leaks. Galvanized iron sheets used for flashings deteriorate due to rusting from rainwater and cause water to enter the building. Zinc flashings last longer but deteriorate with time. Metal flashings (galvanized iron or zinc) that have deteriorated should be replaced well ahead of expected rainy weather. Flashings should be properly installed and joints made in a way that prevents water penetration (**Fig. 4**). Less expensive and easy to fix waterproof self-adhesive sealing strip for roofing is also produced in Sri Lanka and can be used in an emergency, but needs to be replaced after a short period.

Roofs: Roofs should be inspected for signs of damage that would allow penetration of water into the building. **Corrugated roofing sheets** can develop cracks due to heavy items falling on them or other loads placed on them. Damaged sheets should be replaced. If cracks are nominal, temporary repair can be done by sealing the crack with an

inexpensive sealing tape that is produced in Sri Lanka. Tighten nuts at hook bolts where hooks are found to be loose. **Terra-cotta and cement roofing tiles** can also be damaged and must be replaced. Check for evidence of sliding tiles and reposition them correctly. Check also for tiles that are cracked and replace them. **RCC flat roofs** too can develop cracks, especially in tropical weather, and should be regularly inspected before onset of monsoons and corrective action taken. This entails examining roof surfaces for signs of cracks, and chipping along and around the visible cracks and placing suitable waterproof cement rendering as per manufacturer's specifications. Blisters and bubbles on flat roof surfaces (top and bottom) should likewise be rectified by resurfacing with an appropriate rendering. Care should be taken to avoid placing heavy objects on concrete flat roofs that can damage the surface rendering. Damage to the rendering can lead to damage to the roof and possible leaks later. Structural cracks in RCC flat roofs should be inspected by a qualified civil engineer on whose advice remedial action should be taken.

Branches of trees should not be in contact with the roof surface. Cut away all branches that extend very near or over the house. Branches and leaves can clog gutters and impair drain-off of rain water or cause damage to roofs. Also, rodents and reptiles can readily gain access into houses by means of branches of trees that are close to houses.

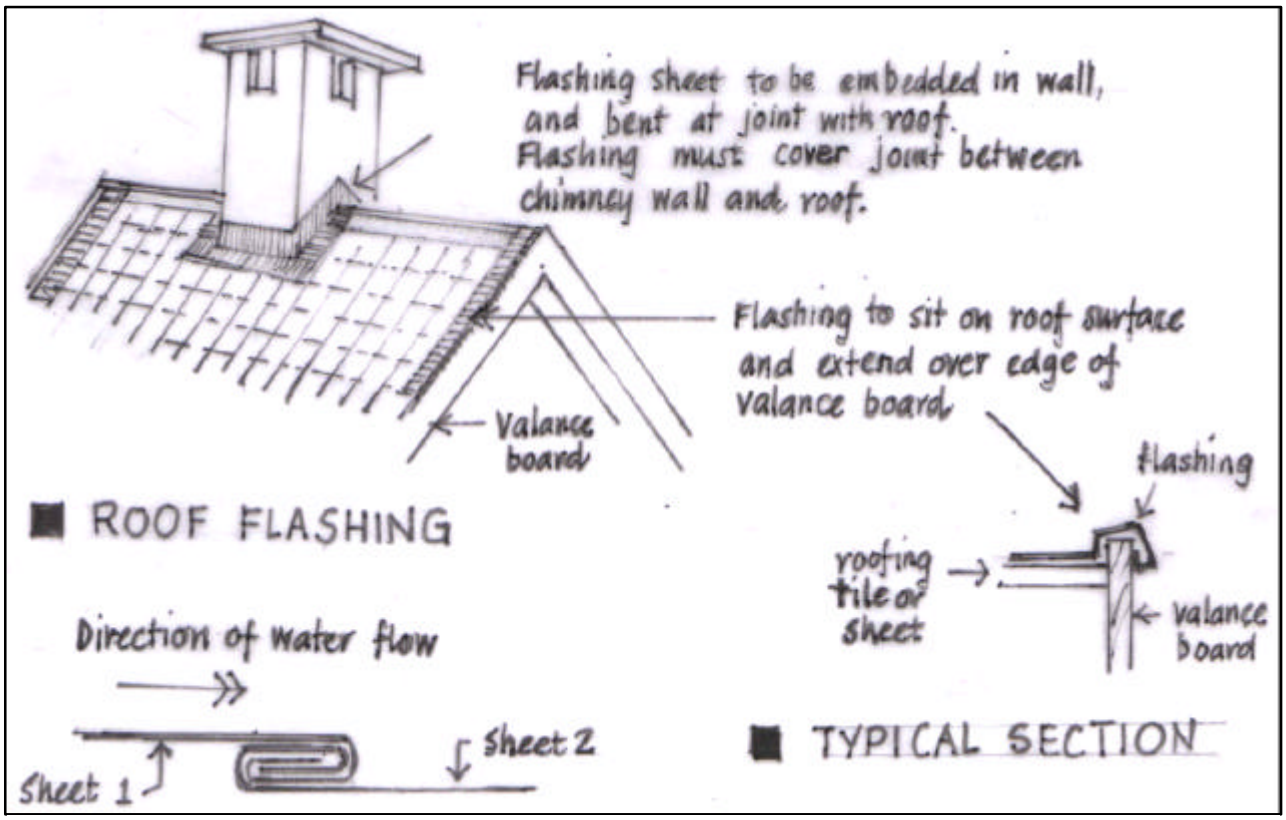

Fig 4 – **G1 & Zinc flashing and joints for roof and gutters (not to scale)**

Gutters and down pipes: Gutters and downpipes should be checked for blockage, leakage (from rusting holes or leaking joints) and areas requiring re-securing and re-sloping and needed repair or replacement should be rectified. Paint deterioration on galvanized iron downpipes should also be noted and rectified by repainting. Check and correctly fix or replace loose bracket supports for gutters and downpipes. Inadequately sized valley gutters allow rainwater to overflow into the house. Re-sizing the valley gutter is the ideal solution but can be labour and cost intensive. A simpler solution, though not the best, is to increase the width of the galvanized iron or zinc gutter by extending the horizontal sides at the edges of the roof. The best option is to resize the valley gutter to take a box shape that can hold an increased volume of water (**Fig.5**). It may also be necessary to increase the number of downpipes to facilitate the flow of rainwater off the roof, thereby improving

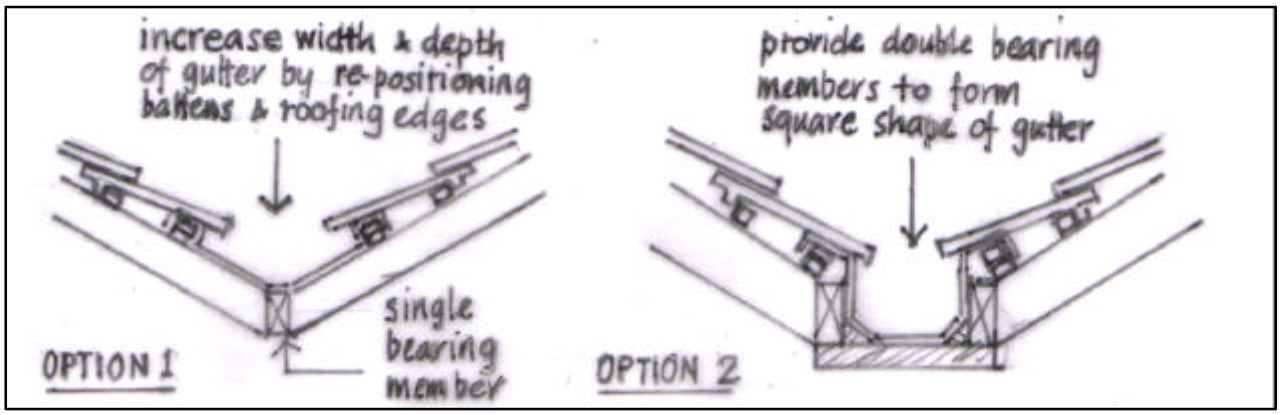

Fig 5 – **Valley gutter options (applicable for tiled roofs and corrugated sheet roofs)**

drain-off and preventing valley gutters from overflowing. Folded joints in sheet metal for gutters and downpipes are better than welded joints, because welding may not always be up to desired standard and soon develop holes along the joint that cause water to leak out (**Fig. 4**).

Eaves: Eaves ceilings, rafters and timber valance/barge boards at roof edges should be inspected regularly for signs of deterioration as these areas are often exposed to sun, wind and rain. Vermin can also attack these components. Repair, re-fix or replace or repaint items as needed. Where defects are identified, it is important to quickly rectify the defects. This may mean removing the decayed timber and replacing damaged components or cleaning and repainting. Valance boards can come loose and would have to be re-fixed properly.

Walls: Masonry walls should be checked for deteriorated brick and mortar. **Exposed brickwork** especially should be examined closely because external surfaces exposed to the elements can result in progressive deterioration of the surface. This deterioration is hastened in areas exposed to salt laden air near the sea. Check if surfaces of brick walls are crumbling or have surface salts. Washing the external walls regularly will reduce the accumulation of corrosive salt and sulfate attack. In addition to washing the walls regularly it is vital that every two years the exposed outer surface must be thoroughly washed and cleaned dry and given two coats of commercially available transparent water repellant outer surface coating that provides resistance to water penetration while facilitating evaporation of moisture into the outer atmosphere. A less expensive protection is to paint the outer surface with sanding sealer that is mixed with thinner. This method can be adopted for exposed brick walls as well as unplastered **stabilized soil/cement block** walls. Depending on the location of the building and the extent of its exposure to wind, rain and salt laden atmosphere the external walls have to be given a coat of thinned sanding sealer every 2 to 3 years.

It is known that rainwater penetration and the resulting moisture condensation in buildings account for most building failures over a period of time. Therefore, it is important that external walls should have the capacity to release any moisture that they absorb into the outer atmosphere as the relative humidity of the air changes. It is important to ensure that the unplastered outer surfaces of external brick walls are provided with a mortar joint that is resistant to water penetration. The weathered joint, concave joint and vee joint are suitable for this purpose (**Fig. 6**).

In instances where plastered walls exposed to rain allow dampness to penetrate into the interior, it would be advisable to re-plaster the surface with a rendering of cement: lime: sand in the proportions of 1:1: 6 or 1: 2: 9, which being porous, permits free evaporation when the weather improves. Use a suitable exterior paint that would enhance the water resistant quality of the surface finish while facilitating evaporation. Make sure that the paint is applied according to the instructions given by the manufacturer.

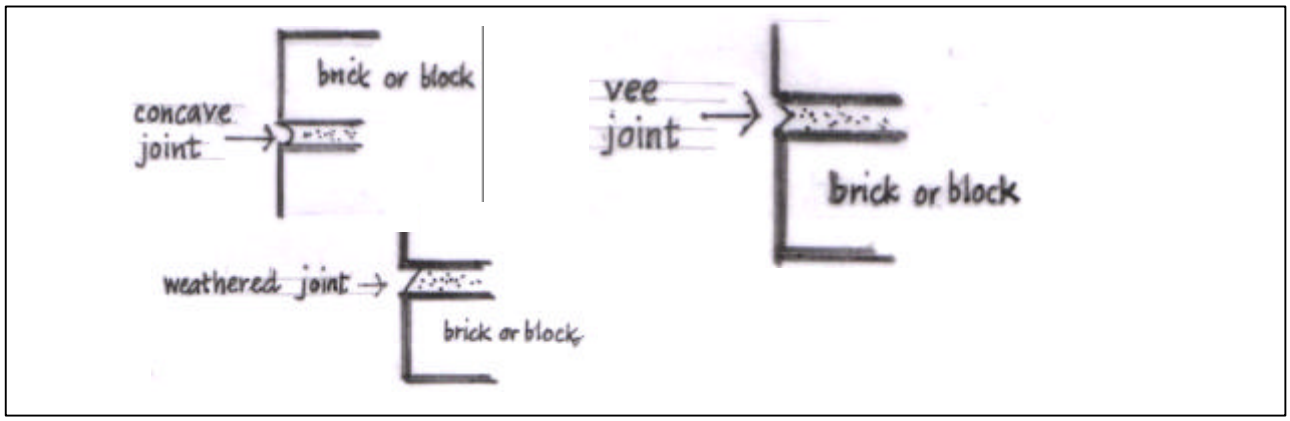

Fig 6 - **External mortar joints for unplastered masonry**

The cause of dampness in walls must be determined. If the cause is a leak in the water supply pipe embedded in walls, it will be necessary to break the wall in the area where dampness has occurred, and identify the exact location of the leak and rectify the leak. In doing so it is important that the repair on the pipe joint is done strictly according the manufacturer's specifications and instructions in order to prevent recurrence of the problem. Re-plaster the wall. Be sure that plastered the wall is quite dry before it is repainted. Dampness in walls can occur due to leaks from the roof and over-exposure to rain as described above. Rectification should be done quickly.

To clean greasy or sooty walls – wash the walls in a solution of washing soda mixed in water. Liquid laundry detergent may also be used. Wear gloves when cleaning. Mildew on walls can be scrubbed with a solution of ½ a cup of bleach and ½ a cup of mild detergent in one gallon of water.

To wash a painted wall – wash or spot clean the surface with a solution of water and mild detergent (e.g. dishwashing liquid). Rinse off thoroughly with clean water. If walls are very dirty use a solution of 2 tablespoons of laundry detergent powder in one gallon of warm (not hot) water. Always wash the surface with clean water after the detergent solution is applied. Dry off moisture with absorbent cloths.

To paint previously painted walls – see General Guidelines for Painting in Quality Assurance Checklist (2) published by Practical Action. See also, section that follows titled "Finishes" that discusses painting and rectification.

In tropical Sri Lanka, timber is not recommended for external walls in permanent houses but may be and is used for some semi-permanent buildings. **Timber boarding**, if used, on exterior walls should likewise be inspected regularly and signs of deterioration noted (blistering, bubbling, rot, damage, insect infestation) and necessary corrective steps taken. Corrective steps may mean repainting, repairing or removal and replacing, nailing etc. Timber boarding below sill level and at gable walls that are exposed to the elements must be given special attention because rain water can cause deterioration of timber work. Lap boarding should also be checked to ascertain if the laps effectively keep out wind and water from entering the building through the walls. If not, the gaps should be filled with a suitable silicone. It must be noted that timber weatherboarding fixed vertically is more vulnerable to rot in the end grain of its lower edges, and water should be allowed to drain freely from them. For this reason, it is best to use horizontal weatherboarding for walls.

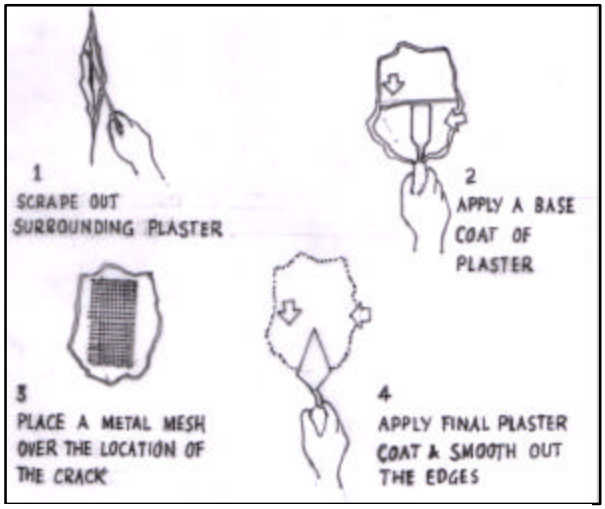

Fig 7 – **Repairing a wall crack (Non structural)**

Cracks in walls: Cracks in walls can occur when there is settlement in the soil under foundations, or foundations are weak and poorly constructed. Another possible cause for destabilizing of foundations could be the presence of roots of large trees located close to the house. See section titled "Plinths" that follows.

Cracks in masonry walls should be monitored for evidence of significant movement. Minor movement due to normal settling and shrinkage should be anticipated and should not be viewed as alarming. Surface cracks or shrinkage cracks develop in masonry walls and remain for some years. These normally do not develop or widen afterwards. Filling Putty and repainting surfaces after two years will solve this problem. One should get worried, if the cracks that are visible in walls are quite wide, and are seen to further widen, and occur through the wall width. Consulting a Builder or Structural Engineer will help in ascertaining the true cause, and possible remedy. If the crack is in the masonry and yet does not warrant extensive repair, the plaster around the crack can be dislodged and a metal mesh can be firmly placed to cover the length of the crack allowing for the mesh to have adequate bearing on both sides of the crack of the crack and plastered over (**Fig.7**).

It is important to determine if the crack in a wall is merely a surface crack or a more serious crack due to structural failure. The chart below is reproduced from the publication titled – "Building Maintenance" (Second Edition – 1987), by Ivor Seeley, which provides guidelines on detecting the degree of weaknesses in walls and appropriate remedies.

Classification of damage to walls and appropriate remedial measures

Category of damage	Degree Of damage	Approximate crack width (mm)	Description of typical damage and ease of repair
1	Very slight	Up to 1	Fine cracks inside the building which can be remedied during normal decoration
2	Slight	Up to 5	Cracks may not be visible externally; doors and windows may stick slightly. Internal cracks easily filled and some external pointing may be required
3	Moderate	5 to 15 (or number of cracks up to 3 wide	Cracks require opening up, external brickwork re-pointed and possibly small amount of brickwork replaced. Doors and windows sticking; service pipes may fracture; weather-tightness often impaired
4	Severe	15 to 25 but also depends on number of cracks	Extensive repair work involving replacing sections of walls, particularly over doors frames distorted, sloping floors leaning or bulging walls, some loss of bearing in beams, and service pipes disrupted.
5	Very severe	Usually greater than 25 but depends on number of cracks	Requires a major repair job involving partial or complete rebuilding. Beams lose bearing, walls lean badly and require shoring. Widows broken with distortion. Danger of instability

Avoid driving nails into walls. Driving nails into walls often cause plaster to break away resulting in more work to patch up the damage. Instead of hammering a nail directly into the wall, drilling a hole is neater and more sensible. When using screws, place a rawl plug in the drilled hole and gently hammer it in, and insert a screw. A manual drill or a hand

augur can be used to drill a neat hole to take the rawl plug. While drilling in a wall, or ceiling, ensure that no services (concealed electric conduits, hot/cold water pipes etc) are passing very near or likely concealed in the wall, you may damage these services, and create some other problems

Concrete: To clean concrete, wet the surface with water. Apply a hot solution of 2 to 2 ½ ounces of washing soda to one gallon of water.

Plinths: Plinths and exposed foundation walls should be inspected for signs of deterioration of bricks and mortar. Cracking due to settlement should also be noted. Rectification of these should not be delayed. Professional advice would be needed if cracking due to settlement is observed. This may require shoring or underpinning if serious structural instability is the cause and the walls and superstructure are endangered. A possible cause for damage to plinths could be the growth of roots of large tree that are located nearby. It would then be necessary to identify the root or roots that cause the damage and cut them at a safe distance away from the building in order to prevent further growth of the roots that may run under the building. In some instances the tree may have to be felled especially if it endangers the house, but that should be avoided if at all possible. As a rule of thumb in determining the extent of root spread, the roots of most trees extend laterally to the same distance of the perimeter of its branches. This helps in knowing whether the roots of trees on the premises could cause structural damage to a house. New trees, if planted, should be located at a safe distance away from buildings. Roots of trees located near buildings in shrinkable clayey soil can do much harm to foundations.

Floors: Heavy and iron furniture, when dragged on the floor, causes abrasion on flooring material. Also, it may stain flooring, if the furniture dragged is rusted. Lifting furniture completely off the floor and keeping furniture where it is required should be good practice instead of dragging. If they are too heavy to be carried insert some suitable padding like folded paper, thick cloth or thick plastic sheeting between the furniture item and the flooring when sliding them across the floor.

A clean floor is not only good to look at, but very much desirable in view of good hygiene and safety. This requires that the floor in every room be swept daily and mopped and dried regularly to get rid of dust, dirt, stains, and grit. Most often soapy water would the do the job well. This will prevent floors from loosing their luster and developing a rough and dull surface with the passage of time. Do not use cleaning acid or wire brushes which will ruin the surface of the floor. An effective and inexpensive remedy for dealing with stained floors is to use a mixture of two spoonfuls of kerosene to a bucket of water to mop the floor; it will also work as disinfectant and gives remarkable relief from ants, flies and mosquitoes.

Take precautions to keep floors, especially in bath / toilet and kitchen free of water, oil, grease and soap. This will prevent people from injuring themselves by slipping and falling.

Dirt and soil carried in by foot traffic is most damaging to floors. Soil trapping devices such as mats and rugs should be used to combat damage and reduce cleaning costs. Use of door-mats on the main entrance and for every bath or toilet entrance is highly advisable, as it discourages excessive dirt and dampness. A good practice to develop is to remove footwear when entering the house. This will reduce the amount of soil and dirt being introduced into the house.

Grading: The grading immediately adjacent to the perimeter of the house should be checked to ensure a slope of one inch per foot for the first six feet away from the house (where practical otherwise three feet would suffice). The purpose is to ensure that rainwater does not stagnate at the plinth of the building. Rainwater gullies in the garden should be cleaned out and tested (**Fig 8**).

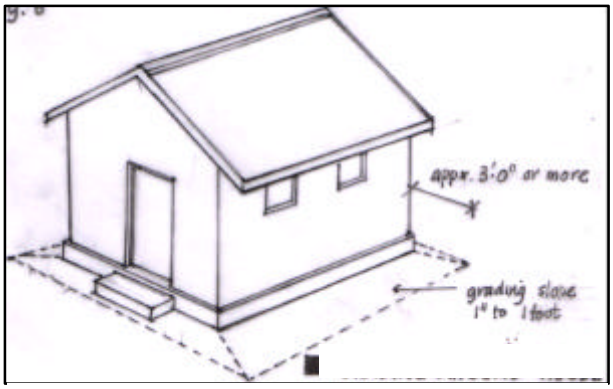

Fig – 8 **Grading around house**

Windows and doors: Beadings and glass panes should be checked. Broken and cracked glass panes should be removed and replaced. The framework around the door or window should be examined closely. The timber frames at sills of windows particularly require close inspection because rainwater tends to cause this still frame to deteriorate quicker than the side frames. Bottom frames of French windows are particularly vulnerable. Any noted defects should be quickly rectified accordingly. Replacement would not be needed if regular painting of the frames is done. Door and window frames should be checked for squareness. If noticeable movement is evident over a six month period, it would be indicative of more serious problems related to settlement.

Wooden doors in baths / toilets tend to decay due to excessive damp and excessive formation of algae. Scrub the first sign of decay with soap / detergent and fill the cracks with a suitable sealing compound to avoid further damage. An aluminum sheet or water resistant laminated veneer covering both sides and underside of the lower part of the bath / toilet door up to a height of 12 inches on a flush panelled door or the width of the bottom rail in a door with inset panels, is very good protection against moisture and decay. It is best to screw the covering material on to the door too in addition to pasting, using water resistant adhesive to ensure that it stays in place.

If it is observed that wooden windows or doors get stuck when opening and closing, the cause should be identified. Often it is because the rebate in the frame has not been sized correctly. An experienced carpenter can use a chisel to alter the rebate edge as needed. If this repair is delayed, the plaster at the edge of the frames can get dislodged by frequent banging when the door or window is forced open or shut.

Make use of a door stopper (inexpensive rubber wedge placed beneath door) to prevent doors from banging shut damaging themselves and cracking the plaster on surrounding walls with the force of the impact. Inexpensive rubber door stoppers are readily available. Protruding door handles can damage adjacent wall surfaces when doors are opened. Suitably sized door stoppers can be fitted at skirting level to prevent door handles from striking adjacent walls.

Door fittings and fixtures like latches, handles, stoppers etc., are best replaced as soon as they are rendered unserviceable.

Aluminium Sliding Windows: Regular cleaning of the top and bottom channels of the frame ensures free and easy movement of the sliding mechanism, and reduces expending extra energy every time the window is opened or closed.

Drilling external holes in the outer face of the bottom channels of the frames help drain rainwater quickly. Make sure the drain holes are not clogged with dirt which is usually the cause for the blockage. A short length of flexible wire of suitable size will be ideal for the job.

During the monsoons, wet patches may form on the inside walls of rooms, due to rainwater seeping through gaps between the windowsills and the frames. To remedy this problem plug the gaps with any suitable water resistant mastic or sealant.

Electrical

The main electrical panel: The main panel should be checked annually for rust or water marks indicating moisture penetration. All circuit breakers should be turned off and on to ensure none have ceased. All fuses should be tightened. A panel which is warm to the touch or smells of burned insulation should be brought to the attention of an electrician and rectified. Burned wires indicating loose or poor connections should be repaired by qualified personnel. All circuits should be labeled. The ground fault system should be tested monthly. Aluminium wire connections inside the distribution panel should be tightened annually. This should be done by a qualified electrician. The area around the panel to a distance of about three feet in all directions should be kept clear of storage items. Poor or loose connections, frayed or damaged wire should be replaced by a qualified electrician. Loose socket outlets and switches should be tightened. Electrically operated water pumps should be inspected semi-annually or more frequently if these are exposed to the elements.

Fuses and circuit breakers: Replace blown fuses with the exact rated value. Failure to do so could result in frequent replacements of fuse elements if it is underrated or serious,

irreparable damage to sensitive electrical apparatus if it is overrated. The circuit breakers must be tested at least once a year. The breaker switch (trip switch) handle must be put to the 'ON' position and pushed down to the 'OFF' position and tripped twice or more using the manual trip button. Every two years the breakers should be tested and tripped using a current injection test set. A breaker may not be suitable to be used after a fully rated short circuit fault interruption occurs.

Electrical appliances: Irons, ovens, electric cookers, toasters, etc., are to be used with proper three-pin sockets with earth connections. It is sensible to get the earth system checked annually by a qualified electrician for continuity and effectiveness. The amperage of the socket should not be below the recommended strength of the electric current. Do not use 5 amp socket outlets for appliances that require a 15 amp power supply or above. This places a heavy load on the 5 amp power supply wire which is of a thinner gauge than the wire used for 15 amp socket outlet connections. Avoid the use of multi-plug adaptors for electrical appliances. Check all appliances that produce an electric shock, even if minor, and immediately correct the defect.

Use of a voltage stabilizer with sensitive electrical apparatus like refrigerators, TVs, videos, hi-fi players, computers etc., is highly desirable in view of frequent voltage fluctuations and spikes that can occur in the local power supply.

Broken power leads (wires) may be temporarily reconnected and the joints wrapped firmly with insulating tape. This should not be viewed as a permanent solution.

Ceiling fans: Ceiling fans tend to gather grime and dust on their blades and need regular cleaning. To clean the fan, switch off the fan and reach it with a stable ladder. Wipe the stem of the fan and the cups at the ceiling and the top of the fan with dry cloth. Wipe the top, bottom and edges of the fan blades thoroughly. Follow the same process with a damp cloth and wipe the fan with a dry cloth. If the edges of the fan blades show signs of rusting, quickly remove the rust with sand paper, wipe the sandpapered portions and apply a coat of anti-corrosive primer and thereafter paint with two coats of enamel paint after the primer has dried.

Wall fans: Unplug the fan and carefully remove the safety screens from the fan and clean them. A soft brush or cotton swab will help get into the small crevices. Wash the screens in warm soapy water. Then, lay the screens on a towel to dry. Clean the dirt off the fan blades with a dry brush or cloth, and thereafter use a slightly damp cloth to wipe excess dirt off the blades. Be careful not to get any water into the motor of the fan. If the fan screens are rusted, use a wire brush to clean off the rust and apply anti-corrosive primer and enamel paint as described above.

Safety: Refrain from attempting even minor replacement or repair jobs, like changing bulbs, starters, fuses with the switch in 'on' position. Turning off the main switch is best so as to ensure that repairs are carried out safely.

Warn and dissuade children from playing with socket outlets, because fingers or metal objects inserted into the sockets could give innocent children a nasty shock that can even prove fatal.

Plumbing and sanitation

Water supply lines should be checked annually for leaks. Operate the main shut-off valves and critical isolating valves to ensure proper operation in the event of an emergency. Leaking or dripping taps should be repaired or replaced. Where well water is used, a water quality test should be performed periodically on the advice of local authorities.

Water taps often leak due to defective washers, worn out threads or an eroded seat. Besides wastage of precious water, it can leave permanent discoloring stains. Worn out washers are easy to replace. The multipurpose spanner and washers (nylon/fibre) are adequate for the job. Use nylon washers for cold-water taps and the fibre washers for hot – water taps. Encourage all occupants to develop the habit of turning off water taps immediately after use to save water and expense related to water usage.

Wash basins should be fitted firmly into the walls and supported with the aid of strong brackets. However, don't lean or sit on wash basins because the brackets are not designed to take extra weight.

Kitchen Sink : Avoid dropping bits of leftovers, vegetable refuse, pieces of paper or plastic, and small items of refuse down your sink, because this causes the waste line to clog and get blocked. It is wise to use a sink strainer at the sink

draining outlet to catch items that are likely to cause blockages. Inexpensive sink strainers are readily available.

Stainless steel sinks can be washed with a solution of dishwashing liquid detergent and water. Rinse and polish dry with a paper towel or soft cloth. Never use scouring powder or steel wool as these will scratch the stainless steel surface. The surface can be brightened by polishing with a cloth dipped in vinegar or ammonia. Or sprinkle a little baking powder on a sponge and rub the sink gently. Rinse the surface of the sink and polish dry with a paper towel.

A sink cleaning plunger can also do a quick job of clearing obstructions in the waste line. Place the plunger over the drainage hole of the wash basin, and pump it hard a few times. Pouring hot water into a clogged pipe may cause the obstruction to be dislodged, but this may not always work.

Water closet commode: It is important to flush the toilet after each time it is used to prevent staining in the bowl. Also daily clean the insides of the bowl of the commode with a toilet brush. Use suitable detergent (the detergent should not kill active bacteria in the septic tank system) when needed. If a stubborn stain ring has formed, apply a thick paste made out of borax and lemon juice. Let it sit for a few minutes and scrub the ring off. The elements work together to break up the stain and bleach it away.

To keep your toilet running well, flush a cup of baking soda once a week. It will help to control the pH level in the septic tank, and therefore keep the toilet running smoothly.

Cisterns at Water closets: Often the shut-off mechanism in a cistern can malfunction due to some defect which should be quickly remedied. If not rectified, there is a possibility that much water can be wasted when the water overflows into the toilet, which can also damage walls. At times the seal at the cistern outlet may not sit properly, which results in cistern water continually seeping into the commode, and in turn will needlessly add to the water in the septic tank. By being alert to quickly remedy these defects there can be a saving of water as well as a reduction in the monthly charges for water. This is a good example of how good maintenance means good economics.

Connecting Pipe: If the connecting pipe i.e. the channel between the commode and the external drainage pipe should ever develop a problem, it is best to seek professional help, since it involves the handling of delicate joints. A minor problem like a loose joint may be fixed with a sealing compound.

Waste plumbing: Visible waste plumbing should be checked periodically for leaks. Slow drains within the house should be cleared to improve flow. A provision is made below the sink or wash basin for a bottle-trap to catch heavier particles of dirt and food, so as not to clog the drainage pipes. This bottle-trap accumulates dirt with the passage of time. Just unscrew the bottle trap and cleanout the dirt. Use cleaning eyes that are fitted to waste lines to clear blocks in waste lines.

Toilet fixtures: Floor mounted toilet fixtures should be checked to ensure they are properly secured to the floor. Wall mounted toilet fixtures should likewise be checked to ensure that the mounting is secure. Quickly rectify loose mountings.

Floor and wall tiling

Check grouting between tiles at all bathrooms as well as kitchen and pantry floors and walls and renew if needed. Check caulking at all bathroom fixtures and renew as needed.

Applying a sealer to tile grout is a necessary step to make sure that the sealing work looks good for years to come. If the grout is not new, clean it well to be sure that it's free of dirt, grease and residue. Then let it dry completely before applying the sealer. Once the area is prepared, use an applicator bottle that dispenses the sealer into a small brush in order to get an even application. Alternatively, choose a chisel tip paintbrush, or try a paint roller that is designed to fit into corners. Whichever tool is chosen to work with, work slowly and use long even strokes to apply the sealer. If any sealing substance gets on the surrounding tile, wipe it up with a soft, clean cloth or a paper towel. Let the sealer dry for 2 - 3 hours and then repeat the process for two additional coats.

Before cleaning the tiles in a bathroom, run extremely hot water for a minute or two. The steam loosens the dirt and soap scum, making it easier to clean.

To get rid of soap scum on tiles (and glass shower doors) heat some white vinegar and use it to clean the tile or glass. Vinegar breaks up the soap scum build-up making it easier to wipe away. If there are stubborn spots, use a pair of rubber gloves and make a paste of baking soda and bleach. Use the mix to scrub away the stains.

To keep a shower stall clean, wipe down the walls after each use. The fastest and easiest way to do this is to keep a squeegee in the shower and wipe the walls after using the shower. Occasionally when the shower is clean, rub the wall tiles and door with lemon oil, or liquid car wax. This will give the tile a shiny finish, and cause the water to bead up and rinse clean after each use.

To replace a cracked wall tile without damaging the surrounding tiles wear protective eye gear, and use an old screwdriver to chip out the grout around the tile. When all of the grout is out, gently tap a chisel into the tile with a hammer. Continue this until the old tile can be pried away and scrape out the adhesive. Spread a thin layer of tile adhesive onto the back of the new tile, and then press it into place. Make sure that any excess adhesive that squeezes out is scraped up and wiped off the tile. Allow the adhesive to dry overnight. Carefully fill the joints with grout. Make sure that the grout is firmly pressed in place and that any gaps

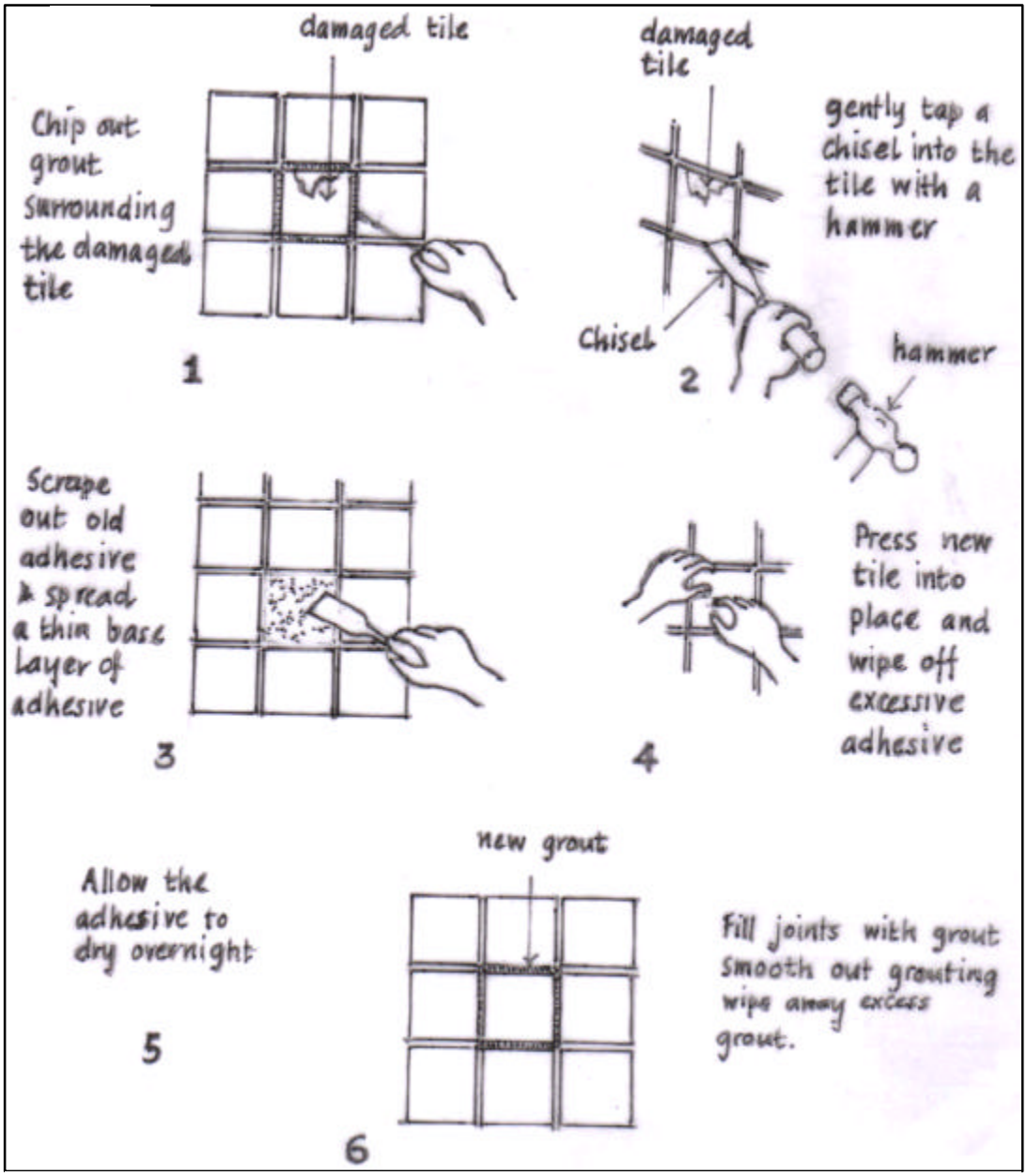

Fig 9 - **Replacing a damaged wall tile**

are filled. Smooth the grouting so that it blends evenly with the surrounding grout lines and use a cloth to wipe away any excess. Then, after the grout begins to dry, use another dry cloth to buff away any hazy residue (**Fig. 9**).

Grease traps: Grease traps that that are connected to the kitchen waste line should be inspected and cleaned out regularly (at least every six months) because of the constant accumulation of non-soluble kitchen waste in them.

Soakage pits: Soakage pits that take bathroom waste or surface water must be inspected and cleaned out regularly. It is important to ensure that the bottom and sides of the pit allow percolation of water into the soil. Where it is observed that the bottom and sides of the pit are caked with any impermeable substance, the substance should be removed. The same procedure should be adopted in the case of soakage pits that are attached to septic tanks.

Septic tanks: Septic tank chambers should be inspected periodically to ensure that the system is working well. During rainy seasons, in areas where the water table level is high, it is often necessary to obtain the service of the local municipal authority to clean out the sludge in septic tank chambers. Do not wait till the septic tank overflows. Take pre-emptive action by checking the septic tank chambers when water table levels show any indication of rising. This can often be discerned by observing the rising water level in nearby wells. When the depth of the scum and solids exceeds one-half of the liquid depth of the tank, it should be cleared. Inspect the baffle for deterioration and take corrective steps to restore it. It is a good practice to empty septic tanks every 3 to 5 years even in areas which do not have high water table levels. Also, it is important to check the first two chambers in septic tanks to ensure that no effluent is leaching into the soil. If cracks are visible in these two chambers, they must be quickly rectified so that the contents of the chambers are properly sealed. Roots of large trees close to the septic tank can cause cracks in septic tank chambers. Therefore, steps have to be taken, as previously described, to prevent tree roots from damaging the septic tank.

If it is noted that the prevailing high water table level poses an environmental threat if a septic tank system is used, it would be best to consider constructing an eco-san toilet that is designed for use in areas with high water table levels. The national Water Supply and Draining Board in Sri Lanka can provide technical details for constructing eco-san toilets.

Assistance can also be sought from Practical Action which has experience and expertise in the design and construction of eco – san toilets.

Exposed metal work: Check all metal work for evidence of rust. Remove rust by thorough brushing with a wire brush and repaint the surfaces with an anti-corrosive paint. Give special attention to metal work that is close to the ground because water and dampness cause rusting to occur very quickly. Structural metal components in particular must be kept free of rust in order to ensure sustained strength and stability of the structure at its base. In environments where the air is salt laden, it is very important that regular checks are made to eliminate rusting of all metal structural elements. Where corrosion or rusting is noted corrective steps described above must be taken without delay.

Painting defects and rectification

Flaking, cracking and blistering of paint can occur on **woodwork**, Also mildew can form on painted surfaces on masonry, and on plaster surfaces. First establish the cause of the defect/s and take remedial steps. Moisture is often a common cause. Usually it is necessary to scrape off the paint and then prepare the surface to take on new paint by washing, cleaning and drying thoroughly. Woodwork surfaces need to be stripped and dusted clean and given a coat of primer and all surface joints have to be made good with suitable filler before repainting. Defective paint on **unplastered masonry** needs to be scraped back using a wire brush and abrasive paper before repainting. **Plaster surfaces** on which flaking of paint are observed need to be made dust-free and sanded lightly to roughen the surface. If flaking is extensive, the surface should be completely stripped before repainting. Where blistering of paint is found on plaster surfaces lightly sand the surface with abrasive paper and prime bare areas before repainting.

Mould appears on external surfaces due to moisture which requires remedying the cause first before repainting. The surface has to be treated with a fungicidal solution and left for 48 hours, then washed down to remove any residue and allowed to dry thoroughly.

Powdery/chalky surface on plaster often occurs when distemper or white wash has been used previously. These former surface coatings should be completely removed by washing with warm water and detergent solutions before rinsing with clean water. It is vital to change the rinsing water regularly. Despite this exercise, if the surface is still slightly powdery it would be necessary to seal the surface with a thinned coat of sealer paint prior to painting.

Specialist advice should be sought for rectification of less common paint defects in buildings.

External paving

Check for areas of ponding* (*water collected on the paved surface) and rectify by repositioning paving materials to ensure proper run-off of surface water. Ensure that loose paving slabs, blocks or bricks are stabilized.

External drains

Ensure that all external drains are cleaned regularly and are free of harmful waste or debris and soil that blocks the passage of surface water. Water should not be allowed to stagnate within drains. Drain slopes should be rectified where stagnation of water is observed.

Boundary walls, fences and gates

Inspect walls and fences for damage or deterioration and correct defects accordingly. Free standing boundary walls of masonry should be checked for stability. Since boundary walls are constantly exposed to rain it is important that the top of boundary walls be provided with a coping that projects outside the sides of the wall surfaces to form a drip edge (**Fig. 10**). Inspect gates for soundness and damage. Note if the gates have dropped at the unhinged ends and whether they require squaring and bracing and remedy accordingly. Check if gates move smoothly. Check if hinges need oiling and oil hinges or apply grease as needed. Sliding gates often become difficult to operate with the passage of time and are not ideal in tropical climate that is humid. Metal tracks deteriorate quickly and need to be carefully maintained and rollers greased regularly.

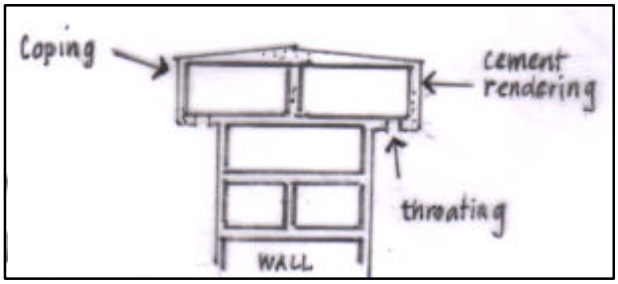

Fig 10- **Typical section at coping in external wall**

Pest infestation

Rodents, vermin and insects can harm the fabric and fittings of a building as well as its occupants. It is therefore necessary to give attention to these unwelcome intruders when considering maintenance of a house.

Rats: It is necessary to keep on the lookout for rats that creep into house for food and can cause damage to elements made of wood, plastic, lead and even copper in the home in addition to being a health hazard. Occupants must examine all likely entry points that rats may use. These can be vents in walls or grilles and other openings that are not protected with a mesh or at wall plate level where ceilings are not used. Once identified, all such entry points should be covered neatly with a suitably sturdy wire mesh (mosquito mesh is inadequate). Rats can enter homes through sewers, drains and drainage pipes that have no cover or the covers are defective. Corrective action should be taken to provide suitable covers without delay. Also, be alert to cut away any branches of trees that touch the house and provide a means for rats to enter the building. Perhaps the most effective way of keeping rats out a house is to ensure that food items are not left exposed. Garbage should be cleared out of the house daily wherever possible. When garbage is stored in the garden for collection, it is important that garbage containers, with firm lids, that are not easily overturned are used. Cats and dogs can overturn some garbage containers which in turn attract rats and crows.

Termites: Termites are very common in tropical countries and in hot and warm climates which are also humid. In areas where there is much termite activity, it is necessary to make daily inspections of likely spots where termites access or enter the building. Look for mud tunnels that indicate the presence of termite activity.

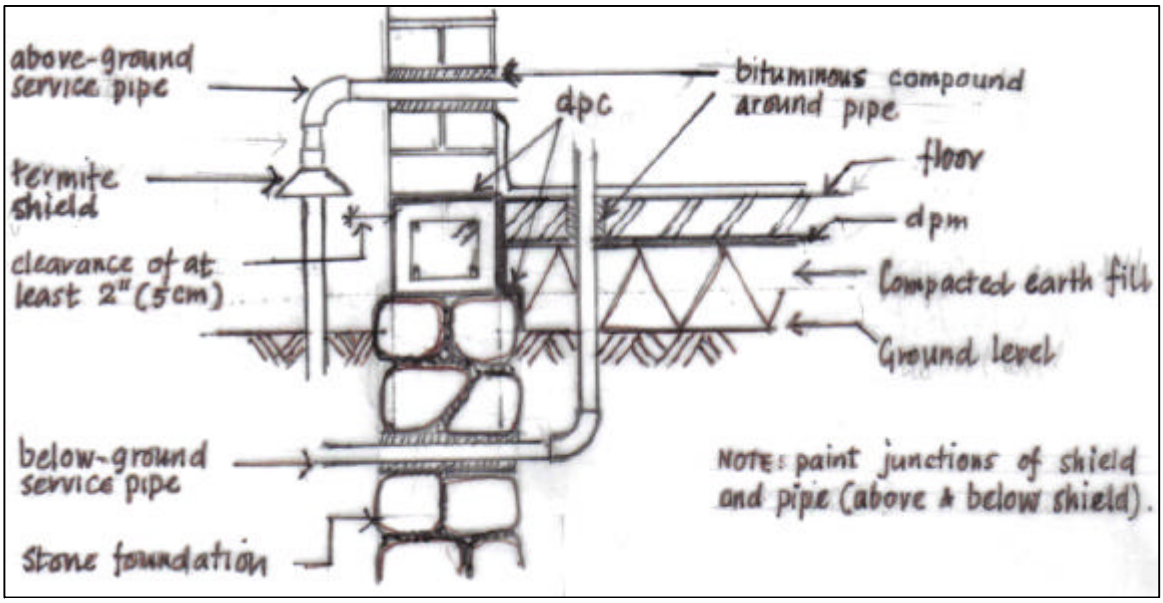

Fig 11 - **Detail section of external wall**

Some steps that can be taken to mitigate termite invasion are listed below:

- Protect service pipes entering building above and below ground by placing termite shields on them (**Fig. 11**).
- Reduce moisture at ground level by providing a cemented apron around the building. Also, repair plumbing leaks without delay. Termites thrive on moisture and remain active where moisture is present. Make sure that water from down pipes from rainwater gutters is directed well away from the building.
- Pull all mulch (decaying leaves) and landscaping at least 6 inches (15 cm) away from the foundation and plinth to reduce the formation of mould on the building. Termites thrive on mouldy wood.
- Inspect the area surrounding the building within at least 150 feet (50 m) and destroy the termite nests.
- Use wood sealer on all wood items including furniture.
- Make sure that cracks and crevices in wood are repaired without delay.
- Make sure that cracks and crevices in masonry and floors are repaired quickly.
- Keep the ants! Ants and termites are natural enemies. By not eliminating local ant colonies in the garden it is possible to keep termites at an arm's distance from a building.
- Avoid use of synthetic stucco (EIFS – Exterior Insulation and Finish Systems) in walls. Water intrusion into the stucco and its moisture retaining quality promote termite invasion.
- Regularly check the inside of fixed furniture items such as kitchen and pantry cupboards as well as built-in cupboards for signs of termite activity and quickly take corrective steps to prevent further termite activity.
- Regularly move mobile furniture and check for termite activity. Be particularly alert to furniture that is placed on the floor near edges that meet the walls, where termites often enter rooms. Also check the base of door frames for evidence of termite activity.
- **Being observant is the best defense against serious termite infestation. Be particularly observant during periods of heightened termite activity, often noticeable in rainy seasons.**

The most economical treatment & prevention method that is relatively easy, is to paint the affected areas and areas likely to be affected by termites, with boric acid dissolved in water. Another method is to spray or paint such areas with a solution made up of 1-ounce of citrus oil to one gallon of water. These methods are relatively easier to use than other non-toxic methods. The use of toxic treatment against

termites is not recommended due to the subsequent leaching of strong poisons into the soil and ground water which is an environmental hazard. Be alert to the presence of termites by noting mud tubes they use to access the building from the ground, similar mud tubes can be observed within buildings where termites are active. Quickly destroy the mud tubes to prevent termite access and infestation.

Insect infestation

Cockroaches, flies, mosquitoes and ants can best be prevented from making their abodes inside the house by regularly cleaning out cupboards and storage units in kitchens and pantries especially. Make sure that no food items are left exposed or accessible to cockroaches or ants. Crevices in floors, walls, woodwork etc. inside the house should be quickly filled or covered because these are common locations for insects to inhabit. Daily move clothes that are hanging close together. Mosquitoes tend to take refuge where cloth are hung.

Take measures to reduce mosquito infestation. Ensure that water is not allowed to collect in receptacles such as tins or pots that are exposed in the garden. Do not allow water to stagnate in drains or in the garden. Closely spaced plantain trees often attract mosquitoes. Avoid having closely spaced clumps of vegetation in the garden. Ensure that opening in external walls, such as windows, are closed before sundown. As an extra safety measure use mosquito nets in bedrooms.

Waste management

Garbage and waste disposal: Good home maintenance requires proper management of garbage and waste. It is important to separate bio-degradable waste from non-biodegradable waste and store them in separate containers. Use a plastic container or bin lined with a plastic bag to store bio-degradable waste and ensure that the container can be properly closed in order to prevent rodents and insects from entering the containers. Use another container or cardboard box for storing non-biodegradable waste and place it close to the container with biodegradable waste. Do not allow biodegradable waste to remain within the house for more than a day. A good practice is to use a home garden composting bin for bio-degradable waste. The non-biodegradable waste can be given to the local municipal garbage-collection vehicle. Garbage should not be left exposed as this will attract cats, dogs, rats, flies and cockroaches etc which is also a health hazard.

A good practice in effective waste management is to aim at **reducing** the source of waste and **recycling** and **re-using** materials. For example if plastic bags are re-used then less bags will accumulate to be thrown away. If wastepaper is re-used or given for recycling it will result in less waste being dumped for disposal.

BUILDING MAINTENANCE SCHEDULES

Inspection checklist

Because a house is a very complicated structure, it's unwise to leave things to memory. It's easy to forget something important and end up with a costly emergency repair. Preventive maintenance does take planning, effort and some financial expense, but, it is the least expensive way to take care of a house. It also brings the greatest rewards when selling a house because it has been maintained well.

Given below is a list of items and areas to be inspected for maintenance that can be adapted according to what is applicable to each house.

- Lot and landscaping; terrain condition, grass, trees, shrubs, bushes, retaining walls, fences, etc.
- Grading: the ground in the immediate vicinity of the foundation.
- Driveway and walkways
- Storage sheds, and other utility annexes
- House exterior: exposed foundation, walls, gutters and downspouts, eaves, and other exterior trim
- Porch and verandah/s
- Walls and ceilings
- Roof and chimney
- Foundation
- Primary structural framework
- Electrical system

- Plumbing system
- Doors and windows
- Kitchen, pantry and storage room
- Bathrooms and toilets
- Bedrooms and closets
- Other rooms
- Stairs and hallways
- Appliances
- Environmental issues; pests, molds, toxic chemicals, etc.
- Others not listed above

After a home maintenance checklist is created, make a **home maintenance schedule** showing what needs to be done for preventive maintenance on a quarterly basis. This schedule may be further broken down on a monthly and weekly basis. Make sure that the schedule is strictly followed at the pre-determined times.

Checks before and during monsoons

In areas affected by seasonal monsoon rains it is vital that a pre-monsoon check be made when a monsoon is expected. Rainwater has a tendency to penetrate every minute crack and crevice in buildings. In doing so it combines or reacts chemically with every material, it comes into contact with, becoming acidic or alkaline in nature, and uses this acquired and very corrosive attribute, to eat its way further into the cracks. Sooner than suspected, it creates channels where none existed and causes unsightly damp patches inside the house. Water may drip along walls during showers. If left unattended, it will weaken everything it comes into contact with, causing paints to blister and peel off, plaster to loosen and fall away and even cause whole structures to weaken and collapse.

This menacing course of events can be prevented or checked by practical, effective, timely maintenance. Areas of the house that are vulnerable to rain and wind should be checked before the onset of monsoons that prevail in the vicinity. Special attention must be given to RCC flat roofs. The exposed top surface of flat roofs must be inspected for signs of cracks. Likewise, the slab soffit (bottom surface) should also be examined closely for signs of hairline cracks. See sub-section above titled 'Roof' for details of corrective steps to be taken. All areas within the building that have shown evidence of dampness or entry of water should be given immediate attention in order to mitigate a worse condition with the onset of rain. At times tell-tale signs may not be discernible until the arrival of the rains. In such instances it is important during monsoons to closely observe areas that manifest dampness or leaks and quickly take corrective steps to mitigate the damaging action of water.

HOME MAINTENANCE SCHEDULE

A well thought out home maintenance schedule will greatly assist occupants of houses to ensure that the house is kept in good repair. Sticking to the schedule and taking timely corrective action is very important to ensure that the house is properly maintained. Set out below is a suggested schedule that can be used by occupants of houses. Refer to maintenance procedures listed above for remedial steps to be taken for the items listed below.

Daily maintenance

- Sweep the floors of the house
- Squeegee clean wall tiles in shower stall
- Clean wall tiles at counter top level as well as work surfaces at kitchen
- Check for evidence of termite activity (mud tunnels) and destroy visible termite routes (See item titled 'termites' in section 'Items to be checked'.

Weekly maintenance

- Wash and clean floors
- Clean ceilings inside the house
- Wash and clean wall tiling in kitchen or other work areas
- Sweep and clean the garden and check for termite activity (this may have to be done twice or three a week
- Flush toilet commode with 1 cup of baking soda

- Clean out external drains and ensure that surface water does not stagnate within drains especially in the rainy season.

Monthly maintenance

- Wash and clean walls that are dirty
- Check electrical ground fault (earth) system
- Clean glass window panes
- Clean fans
- Polish floors that require wax polishing

Three-monthly maintenance

- Clear gutters and down pipes
- Trim overhanging tree branches (especially those that touch the building)
- Check areas where there is evidence of dampness inside the building and identify the cause/s and rectify the defects quickly
- Check taps and water pipes for drips and leaks and rectify accordingly
- Check plumbing waste lines and clean out pipes using cleaning eye
- Oil or grease gate hinges and tracks and rollers
- Inspect and clean out grease traps that take waste from kitchens and baths
- Check water pumps in exposed locations

Half-yearly maintenance

- Clean out gutters and check/clean downpipes, remove blockages
- Check roofs (flat roofs, tiled roofs & corrugated roofing) and remedy defects noted
- Check eaves ceilings and valance boards and remedy as needed
- Check door and window frames for movement and squareness and remedy as needed
- Check circuit breakers and replace any if necessary
- Check water pumps that are not in exposed locations
- Check shut off valves in water supply lines to ensure they are in working order.

Annual maintenance

- Check expose brick wall surfaces and take corrective steps as needed
- Check timber door and widow frames for deterioration and remedy as needed
- Check for cracks in walls and plinths and rectify as necessary
- Check grouting at all tiles on floors and walls and take corrective action if needed
- Check main electrical panel and get an electrician to rectify defects
- Check electrical trip switch. If faulty get assistance from an electrician replace the item
- Check (test & trip) circuit breakers
- Check and clean out grease traps
- Check water supply lines and shut off valves to ensure they are in working order
- Check performance of cistern mechanisms at water closets and rectify as needed
- Check performance of the septic tank and ensure that the first two chambers are free of damage and take remedial action if sewerage is noted to be leeching into the soil. Check if the soakage pit walls are permeable. If not clean out all material that is obstructing permeability.

Two year maintenance

- Wash and clean exposed brick walls and apply transparent water repellant coating on outer surface
- Remove sludge from septic take chambers if needed

Three year maintenance

- Repaint / varnish or wax door and window frames

Four year maintenance

- Repaint exterior and interior of house
- Clean exposed concrete

SUMMARY

Regular inspection and maintenance of the home will help keep the house in good condition and contribute to the health and well being of its occupants. Doing maintenance and repair as soon as defects are observed also keeps small problems from becoming bigger and more costly. Remember that good maintenance means good home economics. Having and following a plan for home maintenance and repair by preparing a maintenance schedule will ensure that nothing important is unattended. Responsible home users must be acutely aware of the need for conservation of energy, water and the environment because these relate to sustainability of not only the house but the surroundings and neighbourhood as well. And finally, a well-maintained house will be more comfortable and retain its value. Good maintenance is a good investment.

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